AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. The following listing provides the amended claims with deleted material crossed out and new material underlined to show the changes made.

1. (Currently Amended) A method of scaling ~~digital video information~~ a bit budget for encoding a digital video picture, said method comprising:

receiving a plurality of different mapping relationships that specify a plurality of different ways for scaling the bit budget based on a plurality of different levels of concern regarding optimal use of a decoder buffer;

~~accepting~~ receiving a ~~scaling~~ value for a relaxation parameter ~~value~~, said ~~scaling relaxation~~ value specifying ~~an amount to relax a scaling performed to prevent buffer underflow or overflow~~ which of the plurality of mapping relationships is to be used to scale the bit budget of the digital video picture;

based on a decoder buffer usage, ~~adjusting a~~ scaling ~~value with said~~ the bit budget by using the specified mapping relationship ~~scaling relaxation value~~; and

encoding said digital video ~~information~~ picture ~~utilizing said adjusted scaling value~~ by using the scaled bit budget,

wherein the receiving the plurality of mapping relationships, receiving the value for the relaxation parameter, and scaling the bit budget are performed by a rate controller.

2-4. (Canceled)

5. (Currently Amended) A method of tracking digital video information complexity, said method comprising:

determining a complexity measure for a current digital video picture, the complexity measure for the picture accounting for a plurality of macroblocks in the picture;

combining said complexity measure for said current digital video picture to a running average complexity measure for a series of digital video pictures in a manner that prevents said current digital video picture from significantly changing said running average complexity measure for the series of digital video pictures; and

encoding said digital video information utilizing said running average complexity measure,

wherein the determining the complexity measure and the combining are performed by a rate controller.

6. (Original) The method of tracking digital video information complexity as claimed in claim 5 wherein said running average complexity is not allowed to change by more than a predetermined percentage.

7. (Original) The method of tracking digital video information complexity as claimed in claim 5 wherein said running average complexity is processed by a non-linear smoothing filter.

8. (Currently Amended) A computer-readable medium storing a computer program ~~for execution~~ which when executed by ~~at least one~~ a processor~~, the program for implementing a method of scaling~~ scales a bit budget for encoding a digital video picture ~~information~~, the computer program comprising sets of instructions for:

receiving a plurality of different mapping relationships that specify a plurality of different ways for scaling the bit budget based on a plurality of different levels of concern regarding optimal use of a decoder buffer;

~~accepting~~ receiving a ~~scaling~~ value for a relaxation parameter ~~value~~, said ~~scaling relaxation~~ value specifying ~~an amount to relax a scaling performed to prevent buffer underflow or overflow~~ which of the plurality of mapping relationships is to be used to scale the bit budget of the digital video picture;

based on a decoder buffer usage, ~~adjusting a~~ scaling ~~value with said~~ the bit budget by using the specified mapping relationship ~~scaling relaxation value~~; and

encoding said digital video ~~information~~ picture ~~utilizing said adjusted scaling value~~ by using the scaled bit budget.

9-11. (Canceled)

12. (Currently Amended) A computer-readable medium storing a computer program ~~for execution~~ which when executed by ~~at least one~~ a processor~~, the computer program for tracking~~ tracks digital video information complexity, the computer program comprising sets of instructions for:

determining a complexity measure for a current digital video picture, the complexity measure for the picture accounting for a plurality of macroblocks in the picture;

combining said complexity measure for said current digital video picture to a running average complexity measure for a series of digital video pictures in a manner that prevents said current digital video picture from significant changing said running average complexity measure for the series of digital video pictures; and

encoding said digital video information utilizing said running average complexity measure.

13. (Original) The computer-readable medium as claimed in claim 12 wherein said running average complexity is not allowed to change by more than a predetermined percentage.

14. (Original) The computer-readable medium as claimed in claim 12 wherein said running average complexity is processed by a non-linear smoothing filter.

15. (Currently Amended) A method of encoding a sequence of video frames, the method comprising:

allocating an initial value for a bit budget for a current frame in the sequence of video frames;

determining an initial value for [[an]]a scale value based on a percentage of a memory buffer space used, said scale value for scaling the bit budget to prevent an underflow or an overflow of said memory buffer;

determining a relaxation control value to relax said scaling of the bit budget;

determining a final bit budget for the current frame based on said scale value adjusted with the relaxation control value; and

encoding the current video frame using the final bit budget,

wherein the allocating, the determining the initial value, the determining the relaxation control value, and the determining the final bit budget are performed by a rate controller.

16. (Currently Amended) The method of encoding a sequence of video frames as claimed in claim 15, wherein said scale value is set in a range from 0 to 1, wherein said relaxation value is set in a range from 0 to 1.

17. (Currently Amended) A computer-readable medium storing a computer program ~~for execution~~ which when executed by ~~at least one~~ a processor~~, the computer program for encoding~~ encodes a sequence of video frames, the computer program comprising sets of instructions for:

allocating an initial value for a bit budget for a current frame in the sequence of video frames;

determining an initial value for an scale value based on a percentage of a memory buffer space used, said scale value for scaling the bit budget to prevent an underflow or an overflow of said memory buffer;

determining a relaxation control value to relax said scaling of the bit budget;

determining a final bit budget for the current frame based on said scale value adjusted with the relaxation control value; and

encoding the current video frame using the final bit budget.

18. (Previously Presented) The computer-readable medium as claimed in claim 17, wherein said scale value is set in a range from 0 to 1, wherein said relaxation value is set in a range from 0 to 1.

19. (New) The method of claim 5 further comprising determining a value for the current digital video picture that represents a deviation between the current digital video picture and an average digital video picture in terms of bits needed to encode the current digital video picture for a particular desired visual quality,

wherein encoding the digital video information comprises using the determined value for the current digital video picture,

wherein the determining the value for the current digital video picture is also performed by the rate controller.

20. (New) The method of claim 15, wherein determining the final bit budget for the current frame comprises multiplying the initial bit budget by the adjusted scale value.

21. (New) The method of claim 15, wherein the scale value adjusted with the relaxation control value is the product of the scale value and the relaxation control value subtracted from the sum of the scale value and the relaxation control value.

22. (New) The method of claim 1, wherein a larger value for the relaxation parameter specifies a smaller scaling of the bit budget for the digital video picture.

23. (New) The method of claim 1, wherein the bit budget is not scaled when the decoder buffer does not deviate from a target path.

24. (New) The method of claim 1, wherein a relaxation value of 0 specifies maximal scaling of the bit budget with respect to decoder buffer usage and a relaxation value of 1 specifies no scaling of the bit budget regardless of the decoder buffer usage.

25. (New) The method of claim 1, wherein the plurality of mapping relationships includes a base mapping relationship when the value for the relaxation parameter is 0, wherein the other mapping relationships are derived by using the base mapping relationship and the value for the relaxation parameter.

26. (New) The method of claim 1, wherein each of the plurality of different mapping relationships maps a plurality of buffer anxiety levels quantifying buffer underflow or overflow to a plurality of scaling values for scaling the bit budget.

27. (New) The method of claim 1, wherein a first value for the relaxation parameter is for specifying a first mapping relationship between the decoder buffer usage and the scaling of the bit budget and a second value for the relaxation parameter is for specifying a second mapping relationship between the decoder buffer usage and the scaling of the bit budget, wherein the first value is for specifying a greater effect on the scaling of the bit budget with respect to the buffer usage as compared to the second value, wherein the first value corresponds to a greater concern regarding optimal use of the decoder buffer.